REMARKS

Claims 1-15 were presented for examination.

Claims 1-15 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. In response, applicant believes the rejection is purely general and is devoid of any reference to, and analysis of, the content of the claims. The Office does not refer to the relevant Federal Circuit's decision *In re Bilski* and does not analyze the eligibility of the claimed subject matter in light of *In re Bilski.*

In accordance with *In re Bilski,* claims directed to **a process that transforms a particular article into a different** state or **thing, are** "surely **patent-eligible**" because such claims would not preempt all other uses. It is affirmed in *In re Bilski* that a controlling factor of the "machine or transformation" test concerns **the nature of the data which are processed** (see page 25, §2 to page 26). In particular, *In re Bilski* contains the holding that **a process is patent-eligible if the data represent physical and tangible objects**.

Claim 1 relates to a method of filtering at least two series of **seismic data** representative of the same zone, according to which:

- a cross variogram of these seismic data series is determined and
- a co-kriging equation which results from this determination is solved for automatically deducing an estimate of the component that is common to the seismic data series, and from the estimate, resolving each of the data series into the sum of their common component and orthogonal residues, said resolution of the data series being used for determining the topography of the subsoil.

For the determination of patent eligibility of claim 1 in the light of *In re Bilski*, the following elements are relevant and must be given due consideration:

i) Seismic data are obtained by propagating seismic waves through the subsurface by means of seismic sources and picking up, by means of seismic sensors, signals resulting from reflections of such seismic waves by the subsurface in the area being explored. The signals produced by the sensors typically include, in addition to the reflections which will be used for producing seismic images of the subsurface area, undesirable components such as multiple reflections, so-called ghosts in marine acquisition, and/or the result of other interactions between the propagation of seismic waves and the subsurface area. In addition, signals produced by the sensors contain various kinds of noises, some originated in the physical or electronic features of the sensors, some extraneous *e.g.* environmental. Hence, seismic data consisting of the signals as recorded cannot be equated to abstract, numerical data.

Seismic traces thus obtained relate to this specific subsurface area and bear information about the geometry and properties (that is the geology) of this subsurface area.

Seismic traces are produced by physical sensors, and represent physical, tangible objects since they contain information relating to the area of the subsurface through which the seismic waves have propagated. **They undisputably meet the condition set out in Bilski and recalled in section 4 above.** Data derived from such signals by applying processing steps retain the "physical content" of the signals produced by sensors and their character of being representative of the same subsurface area i.e. of physical, tangible objects. Such data obtained by processing cannot either be equated to abstract, numerical data.

ii) A processing method which starts from seismic data in a certain state and produces data in other state is a method which processes "physical" signals representative of physical, tangible objects to produce other "physical" signals representative of physical, tangible objects. With reference to the rationale set out in *In re Bilski*, such a method cannot be characterised as pre-empting "other uses" for the sequence of processing steps recited in the claim, since it does not apply to unspecified data. In contrast, it is defined with reference to seismic data and has meaning only to the extent it applies to seismic data.

iii) The output of the method of claim 1 is a resolution of the seismic data series.

The resolution of the data series is obtained by determining the component that is common to the seismic data series. The component that is common to the seismic data series is a category of seismic images illustrated on figure 4, as are the seismic data series illustrated on figures 3a and 3b.

The resolution of the seismic data series is used for determining the topography of the subsoil. This is explicitly mentioned in claim 1.

A resolution of seismic data series can undisputably be characterised as representative of physical, tangible objects, exactly as raw seismic signals or conventional seismic images derived from seismic signals. The output of the method of claim 1 thus meets the test set out in *In re Bilski* for patent eligibility.

It is clear from the foregoing that claim 1 currently on file satisfies the test set out in *In re Bilski* for

the determination of patent eligibility under 35 U.S.C §101. Withdrawal of the outstanding rejection is therefore requested.

Claims 1-15 also stand rejected under 35 U.S.C. §102(b) as being anticipated by "Mapping of Soil Contamination by Using Artificial Neural Networks and Multivariate Geostatistics", by Kanevski *et al.* ("Kanevski *et al.*"). In response, Kanevski *et al.* discloses mixed models (artificial neural network and geostatistical models) used for spatial prediction of soil contamination by Chernobyl radionucleides such as Cesium 137 Cr137 and Strontium 90 Sr90 (see abstract of Kanevski *et al.*). Kanevski *et al.* proposes the use of an exploratory variography analysis of spatial correlations and cross-correlations of Cesium 137 and Strontium 90:

$$2\gamma_{ij}(h) = E[(Z_i(x+h) - Z_i(x))\, Z_j(x+h) - Z_j(x))]$$

Where -Z_i and Z_j correspond to Cs and Sr variables,
- h is a separation vector between points in space x and x+h
- E is the mathematical expectation (see Kanevski *et al.* page 1127, lines 7-11).

The results of the cross-correlation of Cesium 137 and Strontium 90 show that the cross-variogram of Cesium 137 and Strontium 90 goes above a threshold when considering a large scale (see Kanevski *et al.*, figure 1 and page 1127, lines 10-15). This shows the need for an artificial neural network for using correctly data about Cesium 137 (680 measurements) for facilitating the mapping of Strontium 90 (280 measurements) (see Kanevski *et al.*, page 1125, last three lines).

It is clear from the foregoing analysis of the content of Kanevski *et al.* that this reference does not anticipate new claim 1 and the same applies to new claims 5 and 7. Specific differences are set out below.

Kanevski *et al.* does not relate to the field of processing seismic data. The data referred to in Kanevski *et al.* are environmental data representative of soil contamination by radionuclides, Cesium 137 and Strontium 90. Such data are not seismic data. Whereas, the claimed methods relate to the processing of seismic data.

Kanevski *et al.* does not describe a method of processing two series of data representative of the same parameter. Kanevski *et al.* discloses a multivariate data analysis method of data comprising information about different metals, each variable corresponding to a different metal, the different metals being, for example, Cesium 137 and Strontium 90 (see Kanevski *et al.*, page 1125, paragraph titled *"Problem Description and Objectives": "The present study is concerned with spatial analysis and spatial mapping of environmental data. The main attention is paid to multivariate data analysis when it is possible to* ***obtain information about different kind of data.*** *For example, data based on soil contamination by heavy metals or nucleides contains information about different metals. Some of them can be related/correlated each other. In the present study, databases include information about Cs 137 [i.e. CESIUM 137] and Sr 90 [i.e. STRONTIUM 901]").* Whereas, the claimed methods relate to methods of processing two series of seismic data, *i.e.*, two series of **data of the same kind,** generated by the interactions of seismic waves with a zone of the subsurface.

Kanevski *et al.* does not disclose a method comprising solving a co-kriging equation for automatically deducing an estimate of the component that is common to the data series representing the same zone. Kanevski *et al.* proposes a method of cross-correlating data representative of the Cesium 137 Cs137 with data representative of the Strontium 90 Sr90 for demonstrating that the Cesium and the Strontium are related/correlated when considering a large scale. Indeed the cross-variogram of Cesium 137 Cr137 and Strontium 90 Sr90 goes above a threshold when considering a

large scale (see page 1127, lines 10-15).

This has nothing to do with the estimation of a "common component" as recited in new claims 1, 5 and 7, corresponding to the invariant part of the data series Z1(x) and Z2(x). In other words, considering two data series Z1(x) and Z2(x) representative of the same zone, these data series Z1(x) and Z2(x) can be written as:

Z1(x) = COMMON COMPONENT + RESIDUE R1
Z2(x) = COMMON COMPONENT + RESIDUE R2
(see §[0035] of US 2005/0209895).

The term "common component" refers to a component that is common to both Z1(x) and Z2(x), Z1(x) and Z2(x) corresponding to seismic data representative of the same zone. There is no such notion in Kanevski *et al.* and there would be no reason for it to be present since Kanevski *et al.* does not relate to data of the same kind.

Kanevski *et al.* does not describe a method wherein the resolution of the data series is used for determining the topography of the subsoil. In Kanevski *et al.*, the resolution is used for determining soil contamination by the most radiologically important Chernobyl radionuclides (see Kanevski *et al.*, page 1130, lines 14-16). As a conclusion, it is submitted that the invention as defined in new claim 1 is new over Kanevski *et al.* This conclusion also applies to new claims 5 and 7.

In the interest of furthering prosecution, applicant submits the reference also does not render the claimed invention obvious under 35 U.S.C. §103 because, in view of the essential differences set out hereinabove between the claimed subject matter and Kanevski *et al.* (as to the technical field, the aims to be pursued, the technical steps involved), it is clear that Kanevski *et al.* would not be considered at all, or would be considered totally irrelevant, by a person skilled in the art, and would therefore provide no clue or insight whatsoever to a person skilled in the art towards the solution

provided by the invention. It is submitted that in view of these fundamental differences, a detailed discussion of obviousness over Kanevski *et al.* would be pointless and withdrawal of the obviousness rejection is requested in respect of new claim 1. The same request applies to new claims 5 and 7 since the same reasoning applies. Therefore, claims 1-15 should be in an allowable form.

In commenting on the references and in order to facilitate a better understanding of the differences that are expressed in the claims, certain details of distinction between same and the present invention have been mentioned, even though such differences do not appear in all of the claims. It is not intended by mentioning any such unclaimed distinctions to create any implied limitations in the claims. Not all of the distinctions between the prior art and applicant's present invention have been made by applicant. For the foregoing reasons, applicant reserves the right to submit additional evidence showing the distinction between applicant's invention to be unobvious in view of the prior art.

The foregoing remarks are intended to assist the Office in examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention which are rendered patentable, being only examples of certain advantageous features and differences which applicant's attorney chooses to mention at this time.

The Office is authorized to charge any fees due in association with this filing, including extension fees and any other fees or credit any overpayment for this matter to the Deposit Account of Adams and Reese, LLP, Account No. 50-2413.

Reconsideration of the application as amended and allowance thereof is requested.

Please send all future correspondence regarding the above-referenced application to the undersigned at the address appearing below.

Respectfully submitted,

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Date

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